

Application No.: 10/628,305
Docket No. K06-159567M/TBS

AMENDMENTS TO THE CLAIMS:

Please amend the claims as follows. Please add new claim 5.

1. (Withdrawn) A roller member made of bearing steel and performed with a carburization treatment, said roller member comprising:

a surface portion defined as a range from a surface of a rolling face until a depth where a maximum shearing stress acts on, said surface portion containing carbon in total amount being 1.0 to 1.6 wt%;

wherein a matrix of said surface portion contains 0.6 to 1.0 wt% solute carbon, and

wherein carbides precipitate on said surface portion, amount of said carbides is 5 to 20% in an area rate and a particle size of each carbide is 3 μ or less.

2. (Currently Amended) A roller member comprising:

made of high carbon chromium bearing steel and performed with having a carburization treatment, said ~~roller member bearing steel~~ comprising: a surface portion defined as a range ~~from between~~ a surface of a rolling face of the roller member ~~until to~~ a depth where a maximum shearing stress acts thereon, said surface portion containing carbon in a total amount being comprising a range of 1.0 to 1.6 wt% and an amount of residual austenite being comprising a range of 20 vol% to 35 vol%;

wherein a compression residual stress of said surface portion is comprises a range of 150 to 1000 MPa,

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wherein a surface hardness of said surface portion ~~is~~ comprises a range of 64 or higher in Rockwell C hardness,

~~wherein carbides precipitate on said surface portion, an amount of said~~
~~carbide[[s]] precipitate on the surface portion is~~ comprises a range of 10% to 25% in an area rate and ~~a~~ each carbide particle size ~~of each carbide is~~ comprises a range of 3 μ m or less.

3. (Withdrawn) A method of producing a roller member, comprising the steps of:

heating for heating a worked blank of the roller member, said worked blank already formed in a predetermined shape from a bearing steel, in a carburizing atmosphere of carbon potential being 1.2% or more at 840 to 870°C for 3 hours or longer so as to carry out a carburization treatment; and

quenching for quenching said worked blank after said step of carburization treatment,

whereby:

a surface portion of said roller member defined as a range from a surface of a rolling face until a depth where a maximum shearing stress acts on, said surface portion contains 1.0 to 1.6 wt% of carbon;

a matrix of said surface portion contains 0.6 to 1.0 wt% of solute carbon; and

carbides precipitate on said surface portion, an amount of said carbides is 5 to 15% in an area rate and a particle size of each carbide is 3 μ m or less.

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4. (Withdrawn) A method of producing a roller member, comprising the steps of:

first heating for heating a worked blank of the roller member already formed in a predetermined shape from a bearing steel, in a carburizing atmosphere of carbon potential being 0.9 to 1.1% at 930 to 970°C for 1 hour or longer so as to integrate carbide into a matrix;

first quenching for quenching said worked blank after said step of first heating;

second heating for heating said worked blank at 840 to 870°C in a atmosphere of carbon potential being 1.2% or more for 3 hours or longer so as to carry out a carburization treatment; and

second quenching for quenching said worked blank, whereby:

a surface portion of said roller member defined as a range from a surface of a rolling face until a depth where a maximum shearing stress acts on, said surface portion contains 1.0 to 1.6 wt% of carbon;

a matrix of said surface portion contains 0.6 to 1.0 wt% solute carbide; and

carbides precipitate on said surface portion, an amount of said carbides is 10 to 20% in an area rate and a particle size of each carbides is 2 μ or less.

5. (New) The roller member according to claim 2, wherein the high carbon chromium bearing steel comprises JIS SUJ2.